DRAKE DIGITAL

DAV860 Digital Decoder

Instruction Manual

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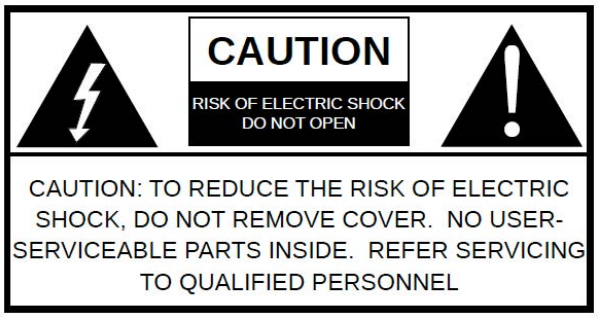
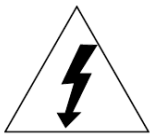
Caution Statements:

WARNING: TO PREVENT FIRE OR ELECTRICAL SHOCK, DO NOT EXPOSE TO RAIN OR MOISTURE


CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN
CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER. NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED PERSONNEL

A product and cart combination should be moved with care. Quick stops, excessive force and uneven surfaces may cause the product and cart combination to overturn.



The lightning flash with arrow head symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

WARNING:	TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS PRODUCT TO RAIN OR MOISTURE. DO NOT OPEN THE CABINET, REFER SERVICING TO QUALIFIED PERSONNEL ONLY.

CAUTION:	TO PREVENT ELECTRIC SHOCK, DO NOT USE THIS (POLARIZED) PLUG WITH AN EXTENSION CORD RECEPTACLE OR OTHER OUTLET UNLESS THE BLADES CAN BE FULLY INSERTED TO PREVENT BLADE EXPOSURE.

ATTENTION:	POUR PREVENIR LES CHOCS ELECTRIQUES, NE PAS UTILISER CETTE FICHE POLARISEE AVEC UN PROLONGATEUR, UNE PRISE DE COURANT OU UNE AUTRE SORTIE DE COURANT, SAUF SI LES LAMES PEUVENT ETRE INSEREES A FOND SANS EN LAISSER AUCUNE PARTIE A DECOUVERT.

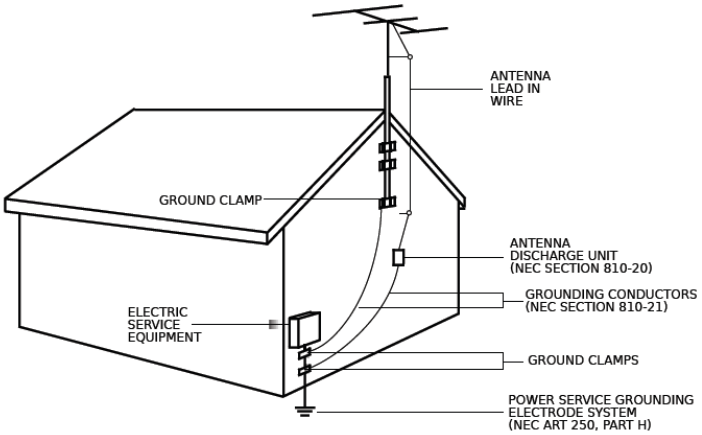
Important Safety Instructions:

1. **Read Instructions:** All the safety and operating instructions should be read before the product is operated.
2. **Retain Instructions:** The safety and operating instructions should be retained for future reference.
3. **Heed Warnings:** All warnings on the product and in the operating instructions should be adhered to.
4. **Follow Instructions:** All operating and use instructions should be followed.
5. **Cleaning:** Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleansers. Use a damp cloth for cleaning.
6. **Attachments:** Do not use attachments that are not recommended by the product manufacturer as they may cause hazards.
7. **Water and Moisture:** Do not use this product near water—for example, near a bathtub, wash bowl, kitchen sink or laundry tub; in a wet basement; or near a swimming pool; and the like.

8. **Accessories:** Do not place this product on an unstable cart, stand, tripod, bracket, or table. The product may fall, causing serious injury to a child or adult, and serious damage to the product. Use only with a cart, stand, tripod, bracket, or table recommended by the manufacturer, or sold with the product. Any mounting of the product should follow the manufacturer's instructions, and should use a mounting accessory recommended by the manufacturer.
9. A product and cart combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the product and cart combination to overturn.
10. **Ventilation:** Slots and openings in the cabinet are provided for ventilation and to ensure reliable operation of the product and to protect it from overheating, and these openings must not be blocked or covered. The openings should never be blocked by placing the product on a bed, sofa, rug, or similar surface. This product should not be placed in a built-in installation such as bookcase or rack unless proper ventilation is provided or the manufacturer's instructions have been adhered to.
11. **Power Sources:** This product should be operated only from the type of power source indicated on the marking label. If you are not sure of the type of power supplied to your home, consult your product dealer or local power company. For products intended to operate from battery power, or other sources, refer to the operating instructions.
12. **Grounding or Polarization:** This product may be equipped with a polarized alternating-current line plug (a plug having one blade wider than the other). This plug will fit into the power outlet only one way. This is a safety feature. If you are unable to insert the plug fully into the outlet, try reversing the plug. If the plug should still fail to fit, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose of the polarized plug. Alternate Warnings – If this product is equipped with a three-wire grounding- type plug, a plug having a third (grounding) pin, the plug will only fit into a grounding-type power outlet. This is a safety feature. If you are unable to insert the plug into the outlet, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose of the grounding-type plug.
13. **Mise à la terre ou Polarisation:** Cet appareil est équipé avec un cordon d'alimentation à trois fils. Il est a brancher sur une prise ayant un connecteur a la terre. Assurez-vous que la connection a la terre ne manque pas.
14. **Power-Cord Protection:** Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the product.
15. **Lightning:** For added protection for this product during a lightning storm, or when it is left unattended and unused for long periods of time, unplug it from the wall outlet and disconnect the antenna or cable system. This will prevent damage to the product due to lightning and power-line surges.
16. **Power Lines:** An outside antenna system should not be located in the vicinity of overhead power lines, other electric light or power circuits, where it can fall into such power lines or circuits. When installing an outside antenna system, extreme care should be taken to keep from touching such power lines or circuits as contact with them may be fatal.
17. **Overloading:** Do not overload wall outlets, extension cords, or integral convenience receptacles as this can result in a risk of fire or electric shock.
18. **Object and Liquid Entry:** Never push objects of any kind into this product through openings as they may touch dangerous voltage points or short-out parts that could result in a fire or electric shock. Never spill liquid of any kind on the product.
19. **Servicing:** Do not attempt to service this product yourself as opening or removing covers may expose you to dangerous voltage or other hazards. Refer all servicing to qualified service personnel.
20. **Damage Requiring Service:** Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:
    a) When the power-supply cord or plug is damaged,
    b) If liquid has been spilled, or objects have fallen into the product,
    c) If the product has been exposed to rain or water,
    d) If the product does not operate normally by following the operating instructions.

    Adjust only those controls that are covered by the operating instructions as an improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to its normal operation, e. If the product has been dropped or damaged in any way, and f. When the product exhibits a distinct change in performance—this indicates a need for service.
21. **Replacement Parts:** When replacement parts are required, be sure the service technician has used replacement parts specified by the manufacturer or have the same characteristics as the original part. Unauthorized substitutes may result in fire, electric shock or other hazards.
22. **Safety Check:** Upon completion of any service or repairs to this product, ask the service technician to perform safety checks to determine that the product is in proper operating condition.
23. **Wall or Ceiling Mounting:** The product should be mounted to a wall or ceiling only as recommended by the manufacturer.
24. **Heat:** The product should be situated away from heat sources such as radiators, heat registers, stoves, or other products (including amplifiers) that produce heat.

NOTE TO CABLE INSTALLER:
THIS REMINDER IS PROVIDED TO CALL THE CATV SYSTEM INSTALLER'S ATTENTION TO ARTICLE 820-40 OF THE NEC THAT PROVIDES GUIDELINES FOR PROPER GROUNDING AND, IN PARTICULAR, SPECIFIES THAT THE CABLE GROUND SHALL BE CONNECTED TO THE GROUNDING SYSTEM OF THE BUILDING, AS CLOSE TO THE POINT OF CABLE ENTRY AS PRACTICAL.


ANTENNA LEAD IN WIRE
GROUND CLAMP
ANTENNA DISCHARGE UNIT (NEC SECTION 810-20)
GROUNDING CONDUCTORS (NEC SECTION 810-21)
ELECTRIC SERVICE EQUIPMENT
GROUND CLAMPS
POWER SERVICE GROUNDING ELECTRODE SYSTEM (NEC ART 250, PART H)

NEC - NATIONAL ELECTRIC CODE
Example of antenna grounding as per National Electrical Code, ANSI/NFPA 70

4 Specifications

INPUT

	Connector:	"F" Female
Standards:	**8VSB:** **QAM:**	ATSC Digital Television Standard A/53E ITU-T J.83 (64 and 256 QAM)
8VSB Mode:	**Tuning Range:** **Symbol Rate:** **Bandwidth:**	UHF (NTSC Ch. 14 - 78), VHF (NTSC Ch. 2 - 13) 10.762 Msymbols/sec 6 MHz
QAM Mode:	**Tuning Range:** **Symbol Rate:** **Bandwidth:**	CATV (NTSC Ch 2 - 135) 5.3606 Msymbols/sec (QAM 256) 5.057 Msymbols/sec (QAM 64) - Auto Detect 6 Mhz
	Single Channel Power Level:	-32 to +45 dBmV
	8VSB Power Level:	-20 to +30 dBmV
	QAM Power Level:	-20 to +20 dBmV
	Return Loss:	12 dB
	Impedance:	75 ohms

OUTPUT

Connector:	**Video:** **Audio:**	"F" Female RCA; Left & Right
NTSC Composite Video:	**Level:** **Flatness:** **Video to Noise Ratio:** **Differential Gain:** **Differential Phase:** **Format:** **Aspect Ratio:** **Closed Captioning:**	1 Volt Peak-to-Peak 1.0 dB p/v (30 Hz to 4.2 MHz) 70 dB ± 0.75% ± 0.50 degree 480i AFD, Center Cut, Letterbox, Full, Zoom 1, Zoom 2 EIA-608
L/R Analog Audio:	**Level:** **Frequency Response:** **Audio Signal-to-Noise Ratio:** **Modes:**	1.0 to 1.2 Volt Peak-to-Peak (at -20 dBFs input) 10.0 to 10.5 Volt Peak-to-Peak (at 0 dBFs input) 2.0 dB p/v (30 Hz to 20 kHz) 67 dB (at -20 dBFs input) Stereo, Mono, SAP

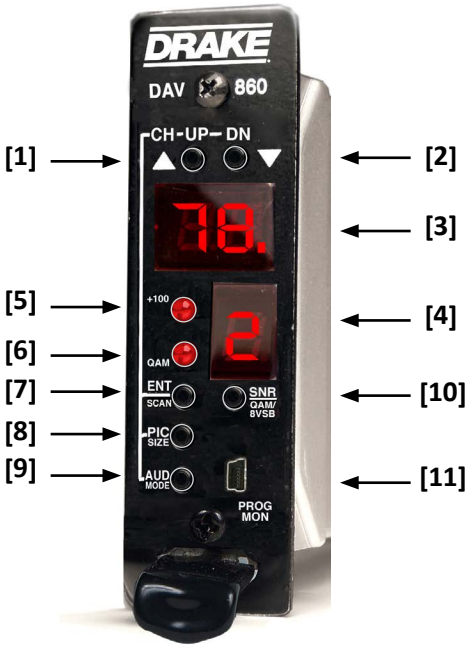
GENERAL

Dimensions:	1.15 x 7.5 x 3.5 inches (29 x 191 x 89 mm)
*** Power:**	0.53A @ 5 VDC and 0.35A @12 VDC
Power Dissipation:	7 W
Weight:	0.8 lbs (0.36 kg)
Operating Temperature:	32 to 122 °F (0 to 50 °C)
Storage Temperature:	-13 to 158 °F (-25 to 70 °C)
Operating Humidity:	0 to 95% RH @ 35 °C Max, non-condensing
Storage Humidity:	0 to 95% RH @ 35 °C Max, non-condensing

ALARMS/MONITORING/CONTROL

Front Panel Indicators:	Major program channel (2-digit LED display) Minor program channel (1-digit LED display) Channel scan (2- & 1-digit LED displays) + 100 Channel (Red LED) SNR (2- & 1-digit LED displays) QAM LED (Red LED) No Lock (flashing QAM LED) Picture Size (2- & 1-digit LED displays) Audio Mode (2- & 1-digit LED displays) Firmware Revision (2-digit LED display) Software Revision (2- & 1-digit LED displays) Unit reset (2- & 1- digit LED displays)
Front Panel Monitoring/Control	CH UP/DN push-buttons (increment major or minor channel up/down) ENT push-button (enters or confirms selection) SCAN push & hold button (initiates channel scan) PIC SIZE push-button (adjusts picture size/aspect ratio) AUD Mode push-button (adjusts audio mode and closed captioning) SNR push-button (measures input signal-to-noise ratio) QAM/8VSB push & hold-button (toggles between QAM & 8VSB) ENT & SNR simultaneously (stops scan at anytime) PIC SIZE & AUD MODE simultaneously (unit reset) PROG MON (custom mini USB-to-RS232 interface)

* See CAUTION on page 8



[1] ▲ (CH-UP) button: Increments major channel or minor channel to next higher channel in the database. Holding this button down will fast scroll through the channels. Channel display will blink to indicate displayed channel is in selection and has not been entered. Press **ENT** button to confirm. If 5 seconds pass without pressing the **ENT** button, the display will return to its last programmed state and stop blinking.

[2] ▼ (CH-DN) button: Decrements channel to next lower major channel in the database. Holding this button down will fast scroll through the channels. The minor channel always goes to the lowest found (typically 1). Channel display will blink to indicate displayed channel is in selection and has not been entered. Press **ENT** button to confirm. If 5 seconds pass without pressing the **ENT** button, the display will return to its last programmed state and stop blinking.

[3] Two Digit Channel Display: Used to identify program major channel. The decimal dot will always be lit. For channels above 99, the +100 LED will blink and the last two digits will be displayed. For example, channel 102 will have +100 LED blink and 02 on the display.

[4] One Digit Channel Display: Used to identify program's minor channel. Range is 1-9, 'A'=10, 'B'=11, 'C'=12, 'D'=13, 'E'=14, 'F'=15. For minor channel 16 or higher the display will read '0' and the actual minor channel can be viewed on a tv/monitor or through the PROG MON connector on a PC. For example, channel 78.2 will be displayed as 78 on the 2-digit display, and 2 on the 1-digit display.

[5] +100 LED: For channels above 99, the +100 LED will blink once for each increment of 100. For example, for channel 378.2, the +100 LED will blink 3 times, number 78 will display on the 2-digit display and digit 2 on the 1-digit display. The blinking will be continuous with small pauses for ease of counting.

[6] QAM LED: Lights when set for QAM input mode.

NOTE: If the unit is not locked to the incoming channel, the QAM led will flash.

6 Front Panel Controls (continued)

[7] ENT/SCAN button: Must be pressed to confirm channel selection, picture size, and audio mode.

Scanning: Holding the ENT button for 10 seconds initiates the scan process. The 1-digit display will display 'swirling segments', the 2-digit LED will display number of channels found. At anytime, pressing the ENT and SNR button simultaneously will stop the scan. Scanning is done automatically in ascending RF frequency from channel center frequency 57 to 857 MHz (8VSB) or from 57 to 861 MHz (QAM) for specified channel range.

In the QAM mode, only the clear (unscrambled) programs will be included in the scan list. Programs having a VCT (virtual channel table) will be displayed as their virtual major - minor channel numbers. Programs received without a VCT will be displayed by the received RF channel number as the major number. Minor numbers will be given in sequence as they appear in the PMT table.

IF THE CHANNEL DATABASE IS EMPTY, THE 2-DIGIT DISPLAY WILL READ '03', THE 1-DIGIT DISPLAY WILL READ 'E' INDICATING A SCAN IS REQUIRED. ALERTS FOR MORE DETAILS.

[8] PIC SIZE button: When pressed, the 2-digit and 1-digit LED will show the current picture size mode per table below. Each additional press of the **PIC SIZE** button will change the mode. The displays will blink to indicate picture size is in selection and has not been entered. Pressing the **ENT** button selects picture size and after a few seconds the displays will return to indicating channel numbers. If 5 seconds pass without pressing the **ENT** button, the display will return to its last programmed state and stop blinking.

Picture Size	2-digit LED	1-digit LED
AFD	AF	d
Center Cut	Pl	C
Letterbox	Pl	L
Full	Pl	F
Zoom1	Pl	1
Zoom2	Pl	2

AFD – Active Format Description - uses AFD data and will automatically switch between Letterbox and Center Cut as defined by broadcaster. In the absence of AFD data or in the presence of any unsupported AFD codes, the unit defaults to Center Cut.

Center Cut – manual setting to ignore AFD data and to display Center Cut. Expands the picture image to fit screen while cropping some image on the left and right without displaying any bars on the screen.

Letterbox – manual setting to ignore AFD data and always display Letterbox. Displays the original picture and aspect ratio while fitting to the screen by applying black bars to the top and bottom.

Full – manual setting to display entire image while fitting the picture to the screen by stretching the image vertically. Black bars are present on the sides and there may be slight distortion of the picture.

Zoom 1 – manual setting to partially expand the image to fit screen after horizontally cropping the image. This mode will still show very thin black bars.

Zoom 2 – manual setting to expand the image to fit screen while cropping the image on the left and right. This mode will display no black bars.

IT IS RECOMMENDED TO USE AFD OR CENTER CUT FOR MAXIMUM SCREEN USAGE WHEN CONVERTING 16:9 ASPECT RATIO SIGNALS FOR VIEWING ON 4:3 TELEVISIONS, WHICH IS THE INTENDED USE OF THE DAV860.

[9] AUD MODE button: When pressed, the 2-digit LED will display 'AU'. The 1-digit display will show the current audio mode. Each additional press of the **AUD MODE** button will change the mode. The display will blink to indicate audio mode is in selection and has not been entered. Pressing the **ENT** button selects audio mode and after a few seconds the displays will return to indicating channel numbers. If 5 seconds pass without pressing the **ENT** button, the display will return to its last programmed state and stop blinking.

AU 1 - Mono – outputs the same mono audio program on both left and right ports. Closed captioning (CC) is off.
AU 2 - Stereo – outputs left and right stereo audio program. CC is off.
AU 3 - SAP – outputs only the mono secondary audio program on both left and right ports. CC is off.
AU 4 - Mono with Closed Captioning – outputs same mono audio program on both left and right ports. CC is on.
AU 5 - Stereo with Closed Captioning – outputs left and right stereo audio program. CC is on.
AU 6 - SAP with Closed Captioning – outputs only the mono secondary audio program on both left and right ports. CC is on.

[10] SNR button: When pressed the 2-digit LED display will change to show input channel SNR. The 1-digit LED display will show 'D' for dB. After 5 seconds, the display will return to show current program channel.

[11] PROG MON mini-usb connector: Used to interface to a computer in order to reprogram the unit with firmware or software changes.

8 Operation

[1] Firmware/Software: Following unit power-up or reset, the boot-up routine will begin. First, the 2-digit LED will display the internal microcontroller firmware revision. After a few seconds, all three LED digits will display the internal HD decoder software revision. Upon completion of the boot-up routine, a previously configured unit will retain and display its last programmed channel, while a new or updated unit will alert a scan requirement.

[2] 8VSB/QAM mode: Holding the SNR button in for 10 seconds will change modes from Off-air 8VSB input to CATV QAM input or vice versa. When in QAM input mode, the QAM LED will light. In 8VSB input mode, the QAM LED will be off. Typically, a new scan will be needed when the input mode has been changed.

[3] Power-save mode: After approximately 3 minutes of no interaction, the unit will enter into its power-save mode by turning off all front-panel LEDs and displays. The dot of the 2-digit LED will remain lit to indicate unit is powered and operating normally. Pressing any button will bring the unit out of power-save mode and current channel and modes will be displayed.

[4] Unit Reset: Holding the **PIC** and **AUD** buttons simultaneously for 5 seconds will reset the unit. All three digits of the unit will display a countdown from 5 to 0 and then reset. After reset, the unit will return to its last programmed state. A reset is required after a firmware or software update. In this instance, the unit will need to be rescanned and picture size and audio mode will need to be set again to restore the unit to operate as configured previously.

[5] Alerts: The DAV860 has 7 alerts to indicate a non-typical condition or error in operation. The 1-digit LED will display 'E'. The 2-digit LED will display the condition number '01' thru '07', as described below.

01 E – Internal communication error between microcontroller and decoder. Perform a Unit Reset or disconnect/reconnect the power to correct this.

02 E – No signal error. TV/monitor screen will display 'No signal'. Verify that incoming RF is connected and desired/undesired channels are at recommended levels. Press the SNR button and confirm that signal-to-noise ratio is greater than 20 for 8VSB, 25 for QAM 64, 30 for QAM 256.

03 E – Channel database error. In 8VSB mode, TV/monitor screen will display 'No terrestrial channels found, Please scan to add channels'. In QAM mode, TV/monitor screen will display 'No cable channels found, Please scan to add channels'. Perform a scan to correct this.

04 E – No program alert. Indicates the channel currently has no program. TV/monitor screen will display 'No program'.

05 E – Audio only alert. Indicates the channel is an audio only program. TV/monitor screen will display 'Audio only'.

06 E – Video only alert. Indicates the channel has video only program.

07 E – Scrambled alert. Indicates the channel has a scrambled program.

CAUTION:

DO NOT EXCEED THE MAXIMUM CURRENT RATING OF THE PSM121 POWER SUPPLY IN THE RMM12 CHASSIS. THE PSM121 CAN POWER A MAXIMUM OF (8) DAV860'S. USE THE PSM125 POWER SUPPLY IF ALL 12 CHASSIS MODULE POSITIONS ARE TO BE USED.

Three Year Limited Warranty

R.L. DRAKE HOLDINGS LLC warrants to the original purchaser this product shall be free from defects in material or workmanship for three (3) years from the date of original purchase.

During the warranty period R.L. DRAKE HOLDINGS LLC or an authorized Drake service facility will provide, free of charge, both parts and labor necessary to correct defects in material and workmanship. At its option, R.L. DRAKE HOLDINGS LLC may replace a defective unit.

To obtain such a warranty service, the original purchaser must:

1. Retain invoice or original proof of purchase to establish the start of the warranty period.
2. Notify R.L. DRAKE HOLDINGS LLC or the nearest authorized service facility, as soon as possible after discovery of a possible defect, of:
    a) the model and serial number,
    b) the identity of the seller and the approximate date of purchase; and
    c) A detailed description of the problem, including details on the electrical connection to associated equipment and the list of such equipment.
3. Deliver the product to R.L. DRAKE HOLDINGS LLC or the nearest authorized service facility, or ship the same in its original container or equivalent, fully insured and shipping charges prepaid.

Correct maintenance, repair, and use are important to obtain proper performance from this product. Therefore carefully read the Instruction Manual. This warranty does not apply to any defect that R.L. DRAKE HOLDINGS LLC determines is due to:

1. Improper maintenance or repair, including the installation of parts or accessories that do not conform to the quality and specifications of the original parts.
2. Misuse, abuse, neglect or improper installation.
3. Accidental or intentional damage.

All implied warranties, if any, including warranties of merchantability and fitness for a particular purpose, terminate three (3) years from the date of the original purchase.

The foregoing constitutes R.L. DRAKE HOLDINGS LLC'S entire obligation with respect to this product, and the original purchaser shall have no other remedy and no claim for incidental or consequential damages, losses or expenses. Some states do not allow limitations on how long an implied warranty lasts or do not allow the exclusions or limitation of incidental or consequential damages, so the above limitation and exclusion may not apply to you.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state. This warranty shall be construed under the laws of Ohio.

For Service, contact:

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Miamisburg, Ohio 45342. USA
Customer Service and Parts Telephone: +1 (937) 746-6990
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